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Pharmaceutico-Analytical study of *Kushtakuthara Rasa* prepared according to the reference of *Bhaishajya Ratnavalli*

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ABSTRACT

Majority of the population is suffering from different types of skin disorders in which the treatment protocols are by palliative means thereby leading to its reoccurrence. There are many formulations mentioned for a particular kind of skin disorder and *Kushtakuthara Rasa* plays an important role in this scenario as it is indicated for all kinds of skin ailments there by necessitating its need for research. *Kushtakuthara Rasa* was prepared according to the reference of Bhaishajya Ratnavalli**,** other methods adopted were *Shodana* of *Parada*, *Gandhaka*, *Guggulu*, *Shilajatu*, *Tamra*, *Loha* and *Abhraka*, Preparation of *Kajjali* and *Rasasindhura*, *Marana* of *Tamra*, *Loha* and *Abhraka*. Preparation of *Kushtakuthara Rasa* was done by preparing it in the form of *Churna* and *Vati*. Analytical parameters like organoleptic characters, Physico-chemical analysis and Instrumental analysis was done for *Kushtakuthara Rasa* (*Churna*), Hand rolled pills, Market Sample, Bhasmas and *Rasasindhura*. Organoleptic characters of prepared *Kushtakuthara Rasa* (*Churna*), Hand rolled pills and Market sample varied significantly. Physico-chemical analysis also differed. SEM-EDX of Metallic Churnas, Bhasmas, *Kushtakuthara Rasa* and Market sample showed the weight and atomic percentage of elements present, its particle size and image. Bhasmas showed the presence of oxygen, FTIR of the 3 samples showed the presence of Organic bonds, XRD of *Kushtakuthara Rasa* (*Churna*) showed the presence of elements and bonds, AAS of *Rasasindhura* showed the presence of Mercury.

Key words: *Kushtakuthara Rasa, Pharmaceutico-Analytical, Sem-Edax.*

INTRODUCTION

Ayurveda is a science which maintains the balance between the way of life and medicine. The main aim of Ayurveda is not only to give relief from diseases, but also to preserve and promote health.[1] In order to fulfil this criteria, Acharya's tried innumerable researches and found that different drugs from different origins are suitable to achieve this.

During the Vedic period much importance was given to herbal drugs for therapeutic purposes. In due course of time, drugs of other origins, i.e. metals and minerals was introduced, which led to the establishment of Herbal, Mineral and Herbo-mineral formulations.

The drugs used in those eras had less shelf life thereby affecting its potency and to combat this, *Rasa Shastra* came into being, which mainly dealt with the use of metals and minerals.

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In this science the drugs such as *Rasa*, *Maharasa* etc. are subjected to different pharmaceutical procedures which converts it from toxic into non-toxic and more potent form which is effective in smaller doses, palatable, quick in action and need shorter duration of administration[2] when compared to herbal formulations. Thus, the evolution of *Rasaushadies* came into existence which later became the main stream of Ayurvedic system of medicine.

Among all the diseases skin disorders are more common and about one in every 3 of all the patients (30-70% of population) suffer from it. In modern science, skin disorders are broadly classified and the drugs used are fundamentally palliative, moreover, their long term use is often associated with adverse effects.

In Ayurveda *Kushta* is considered one among the *Mahagadas.*[3-5] There by highlighting its incidence rate and for each type of *Kushta* mentioned in the classics there are specific formulations.

Kushtakuthara Rasa[6] plays an important role in this scenario as it is indicated for all kinds of *Kushta* thereby bringing in its uniqueness. It has a blend of Herbo-mineral ingredients which contribute in the treatment of skin disorders. It mainly includes *Rasasindura*, *Loha Bhasma*, *Tamra Bhasma*, *Abhraka Bhasma*, *Shuddha Gandhaka*, *Shuddha Guggulu*, *Shuddha Shilajatu*, *Triphala Churna*, *Mahanimba Churna*, *Chitraka Churna* and *Karanja Beeja Churna.*[7] All of which have special properties which help in the treatment of *Kushta*.

Treating various types of *Kushta* is a challenge due to the involvement of *Tridoshas*[8],[9] there by leading to incurability and recurrence.[10],[11]

Hence, an effort has been made to prepare *Kushtakuthara Rasa* as per *Bhaishajya Ratnavalli* and doing an analysis of the prepared medicine as a part of Research protocol to study its composition and give inn for the betterment of the society.

Materials and Methods

Methods adopted:

1. *Shodana* of *Parada* as per *Rasa Tarangini*.[12]
2. *Shodana* of *Gandhaka* as per *Rasa Ratna Samuchchaya.*[13]
3. Preparation of *Kajjali* as per *Rasa Ratna Samuchchaya.*[14]
4. Preparation of *Rasasindhura* as per *Rasa Tarangini*.[15]
5. *Shodana* of *Guggulu* as per *Rasa Tarangini*.[16]
6. *Shodana* of *Shilajatu* as per *Rasa Ratna Samuchchaya*.[17]
7. *Samanya Shodana*, *Vishesha Shodana* and *Marana* of *Tamra* as per *Rasa Tarangini.*[18-20]
8. *Samanya Shodana*, *Vishesha Shodana* and *Marana* of *Loha* as per *Rasa Tarangini* and *Rasa Ratna Samuchchaya*.[21-23]
9. *Samanya Shodana*, Preparation of *Dhanyabhraka* and *Marana* of *Abhraka* as per *Rasa Ratna Samuchchaya*.[24-26]
10. Preparation of *Kushtakuthara Rasa* By adding *Rasasindhura*, *Shuddha Gandhaka*, *Loha Bhasma*, *Tamra Bhasma*, *Shoditha Guggulu*, *Triphala Churna*, *Mahanimba Churna*, *Chitraka Churna*, *Shoditha Shilajatu*, *Abhraka Bhasma* and *Karanja Beeja Churna* as per *Bhaishajya Ratnavalli*.[27]

Preparation of *Kushthakuthara Rasa*

Name of practical: Preparation of *Kushthakuthara Rasa*

Reference: B.R.

Apparatus used: Stainless steel vessel, spatula, cloth, plate, stove etc.

Ingredients:

- *Rasasindhura* : 16 Shaana (48 gms)
- *Shuddha Gandhaka* : 16 Shaana (48 gms)
- *Loha Bhasma* : 16 Shaana (48 gms)
- *Tamra Bhasma* : 16 Shaana (48 gms)
- *Shoditha Guggulu* : 16 Shaana (48 gms)
- *Triphala Churna* : 16 Shaana (144 gms)
- *Mahanimba Churna* : 16 Shaana (48 gms)

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- *Chitraka Churna* : 16 Shaana (48 gms)
- *Shoditha Shilajatu* : 16 Shaana (48 gms)
- *Abhraka Bhasma* : 64 Shaana (192 gms)
- *Karanja Beeja Churna* : 64 Shaana (192 gms)

Procedure: 2 batches of the above quantity was prepared.

For preparing *Churna*:

- *Guggulu* and *Shilajatu* are powdered separately.
- All the remaining ingredients mentioned above are taken and made into a fine powder separately.
- These *Churnas* are then mixed together and placed in a vessel.

For preparing *Vati*:

- Water is taken in a vessel.
- The vessel is heated.
- *Guggulu* and *Shilajatu* is added in it and made into a semisolid consistency.
- Later the remaining *Churnas* are added carefully.
- It is stirred till it becomes into a semisolid consistency.
- The vessel is taken out of the stove and placed out to cool for a period of time.
- Then *Vati* is prepared and kept for shade drying.

Observations

- While mixing all the *Churnas* the colour of the preparation turns brown, with a strong metallic smell associated with the smell of *Karanja Beeja.*
- The *Churna* remains slightly oily, due to the presence of *Karanja Beeja* as an ingredient.
- If *Vati* is prepared, it turns blackish brown in colour with the presence of yellow particles over the surface and there is less metallic smell compared to *Churna*.

Precautions

- *Guggulu* and *Shilajatu* should be made into fine powder before mixing.
- While preparing *Vati's*, care should be taken as due to heat the drugs might get charred and many volatile principles might evaporate.
- Pills have to be rolled at the correct time.

Result

- Yeild of *Churna*: 912 gm
- Yeild of vati: 800

Observations and Results

Table 1: Organoleptic characters of *Kushtakuthara Rasa*, Hand rolled pills and Market sample.

Organoleptic characters	*Kushtakutara Rasa*	*Kushtakutara Rasa* (Hand rolled pills)	Market Sample
Colour	Brown with yellow tinge(spots) over its surface	Blackish brown with yellow spots over its surface	Shiny black
Odour	Prominent smell of Karanjabeejachurna along with a metallic smell	Odourless	Odourless
Taste	Bitter with a metallic taste	Bitter with slight metallic taste	Bitter
Touch	Fine and smooth	Smooth and hard	Very smooth finish
Consistency	Fine powder form	Very hard	Hard

Table 2: Physio chemical analysis of *Kushtakuthara Rasa*, Hand rolled pills and Market sample.

Parameters	*Kushtakuthara Rasa* (*Churna* form)	*Kushtakuthara Rasa* (Hand rolled pills)	Market Sample
Loss on drying	3.56 %	6.2 %	8.66 %
Ash value	36.86 %	32.21 %	36.4 %
Acid insoluble ash	34.80 %	16.0 %	17.5 %
Water soluble ash	30.58 %	25.67 %	28.78 %
Water soluble extractive	21.2 %	20.4 %	27.5 %

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Alcohol soluble extractive	8.4 %	11.2 %	6 %
Hardness	-	3.0 kg/cm^3	3.6 kg/cm^3
Friability	-	0.89 %	0.29 %
Disintegration time	-	120 mins and more	35.16
Physical description	Fine powder	Circular, Biconvex and uniform colour	Circular,Biconvex and uniform colour
Uniformity of weight	-	Not uniform 31.01% to 24.75 % Diameter:10.91 mm	Uniform Diameter:6.32 mm

Figure 1: ***Shodhita Parada***

Figure 2: ***Shodhita Gandhaka***

Figure 3: ***Kajjali***

Figure 4: ***Rasasindhura***

Figure 5: ***Shodhita Guggulu***

Figure 6: ***Shodhita Shilajatu***

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Figure 7: *Marana* of *Tamra*

Figure 8: *Marana* of *Loha*

Figure 9: Preparation of *Dhanyabhraka*

Figure 10: *Kushtakuthara Rasa* (*Churna* form)

Figure 11: *Kushtakuthara Rasa* (hand rolled pills)

Figure 12: *Kushtakuthara Rasa* (Market Sample)

Figure 13: SEM-EDX image of *Rasasindhura*

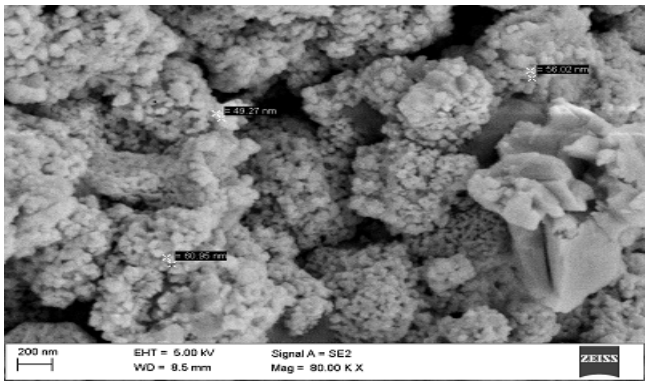

Figure 14: SEM-EDX image of *Tamra Bhasma*

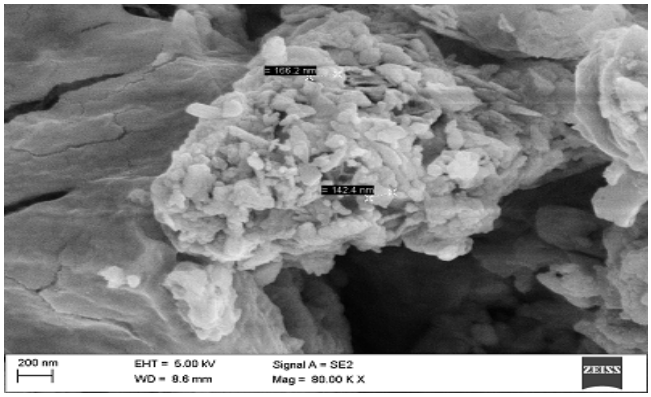

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Figure 15: SEM-EDX image of *Loha Bhasma*

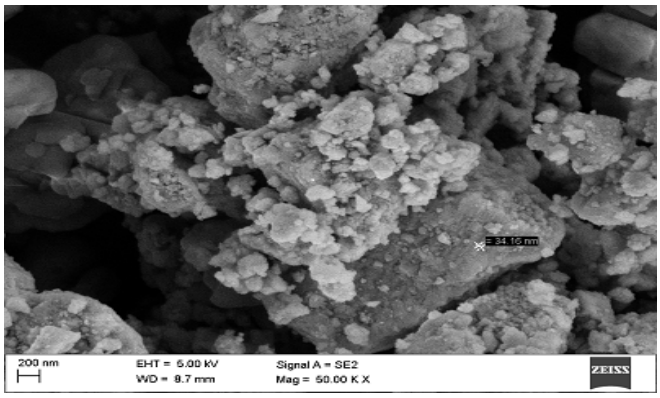


Figure 16: SEM-EDX image of *Abhraka Bhasma*

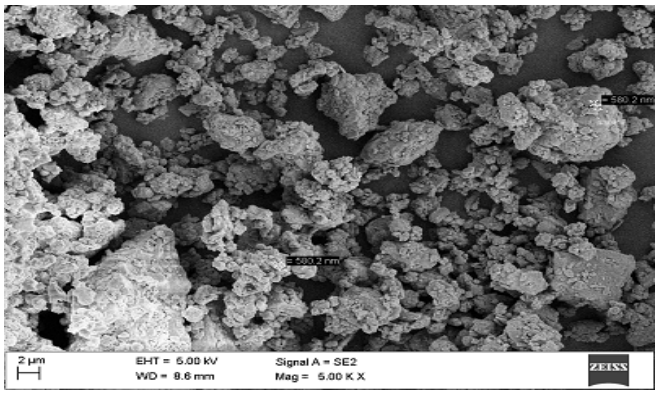


Table 17: SEM-EDX image of *Kushtakuthara Rasa*

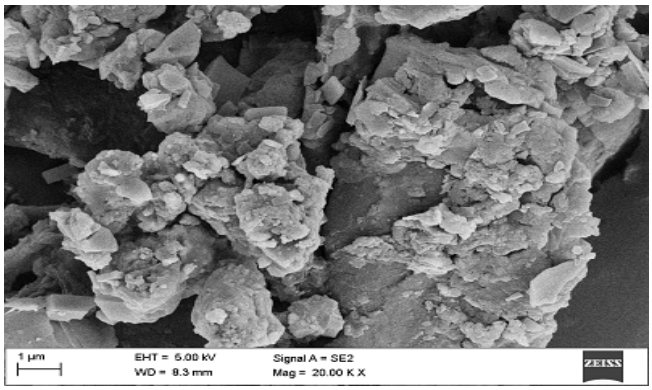
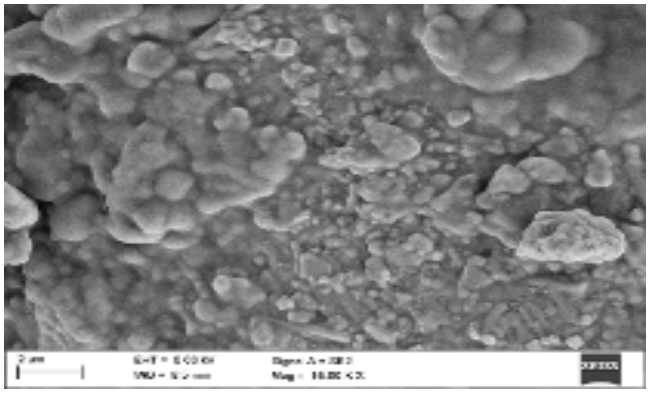


Table 18: SEM-EDX image of Market Sample



DISCUSSION

In today's era, Skin disorders are highly prevelant and all age groups suffer from different kinds of skin diseases. *Kushta* in Ayurveda is considered as one among the *Mahagadas*, highlighting its importance in preventing its incidence and reoccurrence. There are a wide varieties of *Kushtas* mentioned in the classics and there are various formulations mentioned for a specific type of skin disorder. Here, *Kushtakuthara Rasa* comes as an important *Yoga* as it is indicated in all kinds of *Kushtas*. *Kushtakuthara Rasa* has ingredients which are highly potent and all the individual drugs metioned have properties which aid in the treatment of *Kushta*. No such study has been done before, hence the need was to prepare and analyse the product.

The organoleptic Characters were completely different for all the 3 samples, *Churna* was brown, because of the presence of *Abhraka Bhasma* which was brown in colour and the presence of yellow particles are because of the presence of Karanja beeja *Churna*. *Odour* had a predominant smell of *Karanja Beeja Churna* as its quantity was more compared to the other ingredient and it had a specific smell. *Taste* has the presence of strong metallic taste and was bitter. Touch was smooth as it was in fine powder form.

While preparing *Vati*, it had to be *Agni Siddha*, due to which its organoleptic characters completely changed when compared to its *Churna* form (Classical reference). Colour turned blackish brown because during the course of preparation *Guggulu* had to be melted in water after which *Shilajatu* was added. The water turned completely black and later the ingredients was added. Due this it's got a blackish tinge over its surface. Yellow spolts over it was due to the presence of Karanja beeja *Churna* and also because Sulphur is insoluble in water hence it formed bigger particles and were prominent over its surface.

The organoleptic characters of *Vati* (Hand rolled pills) and *Churna* when compared to market sample was totally different. Its colour was totally black. It was

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Odourless and had a bitter taste. It had a very smooth finish as it was tablet punched. Not hard as compared to hand rolled pills.

The formulation in *Churna* form has least amount of moisture content and less loss of volatile principles as the formulation is not subjected to procedure where its in contact with heat and the contents are mixed as it is with maximum amount of active principles principles present as it is. In the form of hand rolled pills the loss on drying is comparatively more when compared to *Churna* as the preparation is subjected to heat for preparation of vati, As a result of which there is loss of volatile principles and as there is contact with water it will naturally have the presence of moisture in it. Market sample shows maximum presence of moisture content compared to *Churna* and hand rolled pills, may be due to the presence of excipients.

In *Churna* form the ash value is most i.e 36.86 % when compared to hand rolled pills and Market sample, thus stating the quality and purity of the formulation is most in this form. Hand rolled pills has the least amount of Ash value i.e 32.21 % , this may be due to the contact of heat which was essential for the preparation of *Vati* (hand rolled pills) thereby hindering its purity and quality. Market sample has an ash value of 36.4 %, stating that it has a good quality and purity and has a minimal difference with *Churna*.

In *Churna* form, Acid insoluble ash is the highest i.e 34.80 %, stating that it's likely to be insoluble in acid. This maybe due to the presence of inorganic substances like Copper, Iron and Silica which are present in the *Bhasmas* in various compound forms.

Water soluble ash is highest in *Churna* form which means that the formulation is highly soluble in water. Thus, it states that in *Churna* form its highly soluble compared to hand rolled pills and market sample.

Decrease in the value of water soluble extractive is seen in *Churna* and hand rolled pills which may be due to Karanja beeja *Churna* which has the presence of oily content which keeps the sample slightly oily / may be due to the heat used during preparation, due to which the water soluble constituents may have got evaporated which maybe a reason /incorrect processing during drying/ storage/formulating and when compared to the market sample, while in the market sample there's no contact with heat as it is tablet punched and the ingredients & processes are done by standard In-House methods its value is more.

Increase in the value of hand rolled pills indicates that it is more alcohol soluble when compared to *Churna* and market sample. Hand rolled pills have more alcohol soluble extracts and hence proves to be having less adulterants/ exhausted material and also *Churna* proves to be beneficial as it has a value of 8.4 % compared to the market sample.

Hand rolled pills have a better friability due to the presence of binding agents such as *Guggulu* and *Shilajatu* devoid of excipients thereby preventing its breakage. Market sample and hand rolled pills have slight variation in friability, stating its of good quality, having good resistance.

Hand rolled pills take more time to disintegrate because of the presence of *Guggulu* and *Shilajatu* and may be due to the absence of excepients when compared to the Market sample. Hand rolled pills have variations in its size during preparation and after drying the weight changes individually. The market available tablets have a uniform weight as they are tablet punched.

SEM-EDAX of *Kushtakuthara Rasa* and Market sample

The image obtained for *Kushtakuthara Rasa Churna* was clear when compared to the market sample. Particles of the *Churna* where distinctive while that of the market sample was bundled up. Particle size of both the sample varied distinctively. Particle size of *Kushtakuthara Rasa* was in the range of 316.9 to 357.6 nm and could be analysed. Particle size of Market sample coulnt be analysed. Size and shape of particles of Market sample couldn't be easily analysed (clustered). Atomic percentage of the contents in *Churna* and Market sample varied distinctively. There was increased percentage of Oxygen in *Kushtakuthara Rasa* i.e. weight % 45.58 & atomic % 63.85 when

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compared to the market sample indicating that it is more bioavailable. There is presence of Carbon in the market sample i.e 44.14 weight % and 57.41 atomic %, There is lesser atomic and weight % of Magnesium, Aluminium, Silica and Iron content in *Kushtakuthara Rasa* when compared to the market sample. There is a slight increase in potassium percentage of Kushtakutara *Rasa* when compared to the market sample. There is presence of Lead in the market sample, which is absent in the prepared medicine. Percentage of Sulphur in the market sample is inevitably high when compared to the prepared medicine. All the elements in the prepared medicine seem to be in the appropriate form and percentage stating that its toxicity is minimal compared to that of the market sample and due to the presence of oxygen and particle size ranging in nanometer form prove it to be having more bio-availability and maximium absorption.

CONCLUSION

Kushtakuthara Rasa has to be made according to the classical norms. The preparation of the ingredients such as *Rasasindhura* and *Bhasmas* have to be made precisely for quality assurance. The preparation has to be made in *Churna* form as per the reference and making in the form of hand rolled pills yield no purpose as the disintegration period of hand rolled pills was more when analysed. *Churna* on the other hand will have better absorption, faster action and there by yielding better results. Analytical parameters reveals that *Kushtakutara Rasa* in *Churna* form has better values compared to hand rolled pills and Market sample. Instrumental analysis of all the Metallic *Churnas* and *Bhasmas* stated that there is decrease in the elements percentage after successive *Putas* and after the formation of *Bhasmas*, there is presence of Oxygen stating it to be in Oxide form. Also elemental analysis shows reduction in the size of the particles ranging in nanometer scale.

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